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ARITHMETIC.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

64. Proposed by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pennsylvania.

If 27 men in 10 days of 7 hours each for \$375 dig a ditch 70 rods long, 25 feet wide, and 4 feet deep, how long a ditch 40 feet wide and 3 feet deep will 15 men dig in 16 days of 9 hours each for \$500?

III. Solution by the PROPOSER.

Mr. Gruber's method is all right except the *assumption* that the length of the ditch increases as the price paid. The \$375 pays for 1890 hours' labor; at the same rate, \$500 would pay for 2520 hours' work. But there are only 2160 hours worked. Hence, the *efficiency* must be increased $\frac{1}{3}$. That is, the ditch will be $66\frac{2}{3}$ rods $\times \frac{4}{3} = 77\frac{1}{3}$ rods long.

Or, in another light: Since 1890 hours' labor are worth \$375, 2160 hours' work, at same wages, are worth \$428 $\frac{1}{3}$. But they get \$500, an increase of $\frac{1}{3}$ as before.

In this problem the *time* is limited—fixed—hence the only thing that can vary is the *efficiency* of the workmen. And it seems plain that it must increase as the *hourly* price increases—not as the *gross* price. Suppose

2 men in 1 day of 10 hours for \$20 dig x rods, and

3 men in 2 days of 10 hours for \$40 dig y rods. What is the ratio of y to x ?

Can the *efficiency*, or productiveness, be found without considering the *hourly* wages?

66. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

Brown adds $m=10\%$ of water to the pure wine he buys, and then sells the mixture at a price $n=10\%$ greater than the cost price of the pure wine. What is his rate per cent. of profit?

Solution by E. W. MORRELL, Professor of Mathematics in Montpelier Seminary, Montpelier, Vermont.

Let $100\% = \text{cost of the wine}$. Then 110% of $110\% = 121\%$, the selling price of the mixture. Hence, $121\% - 100\% = 21\%$, the gain.

67. Proposed by B. F. FINKEL, A. M., Professor of Mathematics and Physics in Drury College, Springfield, Missouri.

A agreed to work a year for \$300 and a suit of clothes. At the end of five months he left, receiving for his wages \$60 and the clothes. What was the suit worth?